

## CLAIMS

1. A reactive precursor feeding manifold assembly, comprising:

a body comprising a plenum chamber;

a valve proximate the body having at least two inlets and at least one outlet, at least one valve inlet being configured for connection with a reactive precursor source, at least one valve outlet feeding to a precursor inlet to the plenum chamber;

a purge stream having a purge inlet to the plenum chamber received upstream of the plenum chamber precursor inlet; and

the body comprising a plenum chamber outlet configured to connect with a substrate processing chamber.

2. The manifold assembly of claim 1 comprising a plurality of said valves having respective precursor inlets to the plenum chamber, the plenum chamber purge stream inlet being upstream of all precursor inlets to the plenum chamber.

3. The manifold assembly of claim 1 wherein the valve has only two inlets and only one outlet.

4. The manifold assembly of claim 1 wherein the valve has only two inlets and only one outlet, the other of the valve inlet being configured for connection with a purge gas source.

5. The manifold assembly of claim 4 wherein the other valve inlet is upstream of the one valve inlet.

6. The manifold assembly of claim 4 comprising a plurality of said valves and having respective precursor inlets to the plenum chamber, the plenum chamber purge stream inlet being upstream of all precursor inlets to the plenum chamber.

7. The manifold assembly of claim 1 further comprising structure on the body configured to mount the body to a substrate processing chamber with the plenum chamber outlet proximate to and connected with a substrate processing chamber inlet.

8. The manifold assembly of claim 1 further comprising structure on the body configured to mount the body to a substrate processing chamber with the plenum chamber outlet proximate to and connected with a substrate processing chamber inlet, the valve when the body is so mounted being at least partially received within peripheral lateral confines of a chamber housing of the substrate processing chamber.

9. The manifold assembly of claim 8 wherein the valve when the body is so mounted is totally received within peripheral lateral confines of said chamber housing.

10. The manifold assembly of claim 1 comprising:

a plurality of said valves having respective precursor inlets to the plenum chamber, the plenum chamber purge stream inlet being upstream of all precursor inlets to the plenum chamber;

structure on the body configured to mount the body to a substrate processing chamber with the plenum chamber outlet proximate to and connected with a substrate processing chamber inlet, the respective valves when the body is so mounted being at least partially received within peripheral lateral confines of a chamber housing of the substrate processing chamber.

11. The manifold assembly of claim 10 wherein the valves when the body is so mounted are totally received within peripheral lateral confines of said chamber housing.

12. The manifold assembly of claim 1 wherein the plenum chamber is longitudinally elongated having a longitudinal axis, the plenum chamber having a first longitudinal axis end and a second longitudinal axis end, the plenum chamber purge inlet being proximate the first end, the plenum chamber outlet being proximate the second end.

13. The manifold assembly of claim 12 wherein the plenum chamber purge inlet is on the longitudinal axis.

14. A reactive precursor feeding manifold assembly, comprising:

- a body comprising a plenum chamber;
- a precursor feed stream on the body in fluid communication with the plenum chamber at a precursor inlet to the plenum chamber;
- a purge stream on the body in fluid communication with the plenum chamber at a purge inlet to the plenum chamber which is upstream of the plenum chamber precursor inlet and angled from the plenum chamber precursor inlet; and

the body comprising a plenum chamber outlet configured to connect with a substrate processing chamber.

15. The manifold assembly of claim 14 wherein the plenum chamber purge inlet is angled from the plenum chamber precursor inlet by from about 80° to 100°.

16. The manifold assembly of claim 14 wherein the plenum chamber purge inlet is angled from the plenum chamber precursor inlet by from about 89° to 91°.

17. The manifold assembly of claim 14 further comprising a valve in the precursor feed stream proximate the body.

18. The manifold assembly of claim 14 further comprising a 3-way valve in the precursor feed stream proximate the body.

19. The manifold assembly of claim 14 further comprising structure on the body configured to mount the body to a substrate processing chamber with the plenum chamber outlet proximate to and connected with a substrate processing chamber inlet.

20. The manifold assembly of claim 14 wherein the plenum chamber is longitudinally elongated having a longitudinal axis, the plenum chamber having a first longitudinal axis end and a second longitudinal axis end, the plenum chamber purge inlet being proximate the first end, the plenum chamber outlet being proximate the second end.

21. The manifold assembly of claim 20 wherein the plenum chamber purge inlet is on the longitudinal axis.

22. A reactive precursor feeding manifold assembly, comprising:

a body comprising a plenum chamber;

a plurality of respective precursor feed streams on the body in fluid communication with the plenum chamber at respective precursor inlets to the plenum chamber;

a purge stream on the body in fluid communication with the plenum chamber at a purge inlet to the plenum chamber which is upstream of all precursor inlets to the plenum chamber, the plenum chamber purge inlet being angled from all precursor inlets to the plenum chamber; and

the body comprising a plenum chamber outlet configured to connect with a substrate processing chamber.

23. The manifold assembly of claim 22 wherein no plenum chamber precursor inlet is angled from any other plenum chamber precursor inlet.

24. The manifold assembly of claim 23 wherein the plenum chamber purge inlet is angled from the plenum chamber precursor inlets by from about 80° to 100°.

25. The manifold assembly of claim 23 wherein the plenum chamber purge inlet is angled from the plenum chamber precursor inlets by from about 89° to 91°.

26. The manifold assembly of claim 22 further comprising a valve in the respective precursor feed streams proximate the body.

27. The manifold assembly of claim 22 further comprising a 3-way valve in the respective precursor feed streams proximate the body.

28. The manifold assembly of claim 22 further comprising structure on the body configured to mount the body to a substrate processing chamber with the plenum chamber outlet proximate to and connected with a substrate processing chamber inlet.

29. The manifold assembly of claim 22 wherein the plenum chamber is longitudinally elongated having a longitudinal axis, the plenum chamber having a first longitudinal axis end and a second longitudinal axis end, the plenum chamber purge inlet being proximate the first end, the plenum chamber outlet being proximate the second end.

30. The manifold assembly of claim 29 wherein the plenum chamber purge inlet is on the longitudinal axis.

31. A reactive precursor feeding manifold assembly, comprising:

- a body comprising a plenum chamber;
- a plurality of precursor feed streams on the body in fluid communication with the plenum chamber at respective precursor inlets to the plenum chamber;
- a purge stream on the body in fluid communication with the plenum chamber at a purge inlet to the plenum chamber which is upstream of the plenum chamber precursor inlets;
- the body comprising a plenum chamber outlet configured to connect with a substrate processing chamber; and
- structure on the body configured to mount the body to a substrate processing chamber with the plenum chamber outlet proximate to and connected with a substrate processing chamber inlet.

32. The manifold assembly of claim 31 wherein the structure comprises a projection on the body.

33. The manifold assembly of claim 31 wherein the structure comprises a flange.

34. The manifold assembly of claim 31 further comprising a valve in the respective precursor feed streams proximate the body.



35. The manifold assembly of claim 31 further comprising a 3-way valve in the respective precursor feed streams proximate the body.

36. The manifold assembly of claim 31 further comprising a 3-way valve in the respective precursor feed streams proximate the body, one inlet to the 3-way valve being configured for connection with the respective precursor feed stream, another inlet to the 3-way valve being configured for connection with a purge gas source, the another inlet being upstream of the one inlet.

37. The manifold assembly of claim 31 wherein the plenum chamber is longitudinally elongated having a longitudinal axis, the plenum chamber having a first longitudinal axis end and a second longitudinal axis end, the plenum chamber purge inlet being proximate the first end, the plenum chamber outlet being proximate the second end.

38. The manifold assembly of claim 37 wherein the plenum chamber purge inlet is on the longitudinal axis.

39. A reactive precursor feeding manifold assembly, comprising:

an elongate body comprising an elongate plenum chamber, the plenum chamber having a longitudinal axis;

a plurality of precursor feed streams on the body in fluid communication with the plenum chamber at respective precursor inlets to the plenum chamber received along the longitudinal axis;

a purge stream on the body in fluid communication with the plenum chamber at a purge inlet to the plenum chamber which is upstream of the plenum chamber precursor inlets;

the body comprising a plenum chamber outlet configured to connect with a substrate processing chamber; and

structure on the body configured to mount the body to a substrate processing chamber with the plenum chamber outlet proximate to and connected with a substrate processing chamber inlet, and with the longitudinal axis being substantially vertical.

40. The manifold assembly of claim 39 wherein the structure comprises a projection on the body.

41. The manifold assembly of claim 39 wherein the structure comprises a flange.

42. The manifold assembly of claim 39 wherein the plenum chamber purge inlet is on the longitudinal axis.

43. The manifold assembly of claim 39 further comprising a valve in the respective precursor feed streams proximate the body.

44. The manifold assembly of claim 39 further comprising a 3-way valve in the respective precursor feed streams proximate the body.

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45. A reactive precursor feeding manifold assembly, comprising:

an elongate body comprising an elongate plenum chamber, the plenum chamber having a longitudinal axis, the plenum chamber having a first longitudinal axis end and a second longitudinal axis end;

the plenum chamber comprising a plurality of precursor inlets received along the longitudinal axis;

respective precursor feed streams on the body feeding to the plenum chamber precursor inlets, the respective precursor feed streams including an elongated segment joining with its plenum chamber precursor inlet and which is oriented substantially normal to the longitudinal axis;

respective valves positioned proximate the body in the respective precursor feed streams, the respective valves having at least two inlets and at least one outlet, one of the valve inlets being configured for connection with a reactive precursor source, another of the valve inlets being configured for connection with a purge gas source;

a purge gas inlet to the plenum chamber at the first longitudinal axis end and upstream of all precursor inlets to the plenum chamber;

a purge gas stream on the body feeding to the purge gas inlet, the purge gas stream including an elongated segment joining with the purge gas inlet and which is substantially aligned on the longitudinal axis; and

the body comprising a plenum chamber outlet at the second longitudinal axis end configured to connect with a substrate processing chamber.

46. The manifold assembly of claim 45 wherein the valves have only two inlets and only one outlet.

47. The manifold assembly of claim 45 wherein the another valve inlet is upstream of the one valve inlet.

48. The manifold assembly of claim 45 further comprising structure on the body configured to mount the body to a substrate processing chamber with the plenum chamber outlet proximate to and connected with a substrate processing chamber inlet.

49. The manifold assembly of claim 48 wherein the structure is configured to mount the body to a substrate processing chamber with the longitudinal axis being substantially vertical.

50. The manifold assembly of claim 48 wherein the structure comprises a projection on the body.

51. The manifold assembly of claim 48 wherein the structure comprises a flange.

52. The manifold assembly of claim 45 further comprising structure on the body configured to mount the body to a substrate processing chamber with the plenum chamber outlet proximate to and connected with a substrate processing chamber inlet, the respective valves when the body is so mounted being at least partially received within peripheral lateral confines of a chamber housing of the substrate processing chamber.

53. The manifold assembly of claim 52 wherein the valves when the body is so mounted are totally received within peripheral lateral confines of said chamber housing.

54. The manifold assembly of claim 45 wherein the plenum chamber purge inlet is on the longitudinal axis.

55. The manifold assembly of claim 45 wherein,  
the valves have only two inlets and only one outlet;  
the another valve inlet is upstream of the one valve inlet; and  
the plenum chamber purge inlet is on the longitudinal axis.

56. The manifold assembly of claim 55 wherein the structure comprises a projection on the body.

57. The manifold assembly of claim 55 wherein the structure comprises a flange.

58. The manifold assembly of claim 45 wherein,  
the valves have only two inlets and only one outlet;  
the another valve inlet is upstream of the one valve inlet; and  
the structure is configured to mount the body to a substrate processing chamber with the longitudinal axis being substantially vertical.

59. The manifold assembly of claim 58 wherein the structure comprises a projection on the body.

60. The manifold assembly of claim 58 wherein the structure comprises a flange.

61. The manifold assembly of claim 58 wherein the plenum chamber purge inlet is on the longitudinal axis.

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